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JAMES M. GWIN

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U. S. DEPARTMENT OF  
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FARMERS' BULLETIN No. 697

DUCK  
RAISING



**D**UCK RAISING is conducted successfully both as a side issue on general farms and as a special business on a large scale. The Pekin is the best breed for duck farming. Many breeds are very ornamental as well as useful, making the breeding of real interest wherever there are natural facilities for keeping waterfowl.

The rearing of ducks for market on a large scale requires extensive capital and experience. Young ducks forced for rapid growth and marketed at from 8 to 12 weeks of age are called "green" ducks. They weigh from 4½ to 6 pounds each and are the principal source of income on commercial duck farms.

A location on a stream of running water is essential for the best results in duck farming.

The market for ducks is usually limited to the larger cities, and the demand is not nearly so general as the demand for chickens, while the market for ducks' eggs is even more limited.

Washington, D. C.

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# DUCK RAISING

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## NUMBERS OF DUCKS IN THE UNITED STATES

ACCORDING to the Federal census of 1920 there were 2,817,624 ducks in the United States on January 1 of that year, valued at \$3,373,966. No statistics on ducks were taken in the 1925 census. The 1920 census shows a slight decrease in numbers from the preceding census of 1910, indicating that the production of ducks in the country as a whole is not quite holding its own. The decrease occurred in the Southern States, but several of the States in which ducks are raised on special duck farms showed an increase in the number kept. California, Massachusetts, and Colorado showed an increase of 4, 7, and 12 per cent, respectively. New York, which contains by far the greatest number of commercial duck farms, showed no change in the number of ducks, but as the number raised on commercial farms undoubtedly increased materially during that period a decrease in the number on general farms must have occurred to offset this increase on duck farms.

Ducks are most numerous in the following States, arranged according to their production: Iowa, Illinois, Pennsylvania, New York, Missouri, Minnesota, Tennessee, Ohio, South Dakota, Indiana, and Nebraska, the number ranging from about 235,000 head in Iowa to 100,000 in Nebraska. There are about the same number of ducks as of geese in this country, and only about three-fourths as many ducks as turkeys. The number of ducks kept in proportion to the total population is much lower in the United States than in most other countries. The relative number in Great Britain, Ireland, and New Zealand is several times larger than in this country. The duck products in this country are consumed largely by the foreign-born population.

## BREEDS OF DUCKS

There are 11 standard breeds of ducks which have been admitted to the American Standard of Perfection. These breeds may be divided into three classes: (1) The meat class, including the

Pekin, Aylesbury, Muscovy, Rouen, Cayuga, Buff, and Swedish; (2) the egg class, represented by the Runner; and (3) the ornamental class, composed of the Call, the Crested White, and the Black East India. Many farms in the South and the Middle West keep ducks of mixed breeding, which are generally small-sized, poor layers, and undesirable types of market duck. Except the Muscovy, all our economic breeds of ducks are said to have originated from the wild Mallard.

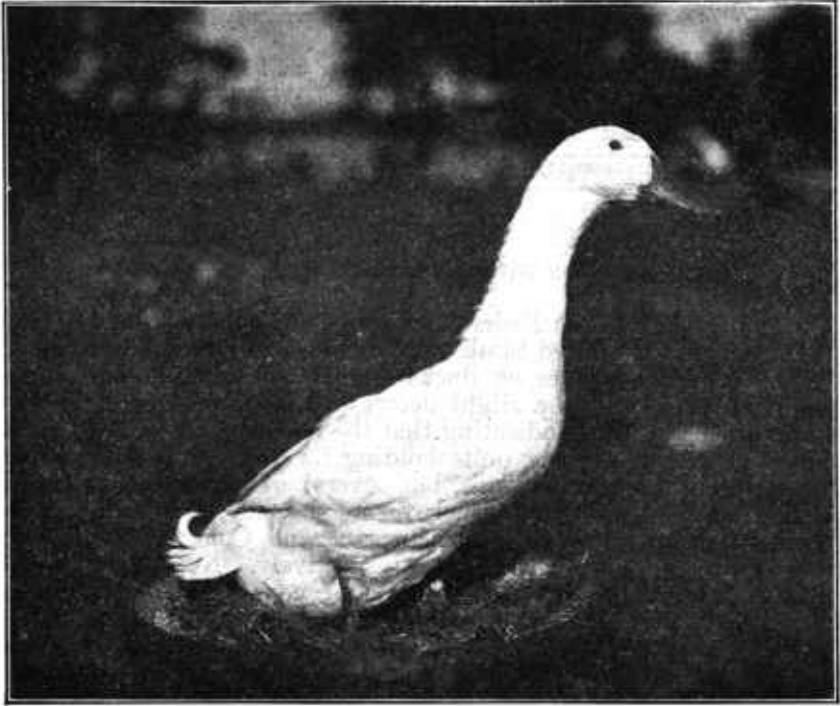


FIG. 1.—Pekin drake

#### THE MEAT CLASS

##### THE PEKIN

The Pekin is almost the only breed kept by American commercial duck farmers who make a specialty of producing "green" ducks; it is also the most popular breed on general farms. Green ducks are ducklings which are grown rapidly and marketed at from 8 to 12 weeks of age, when they weigh about  $4\frac{1}{2}$  to 6 pounds apiece. If not sold at that time the market quality of their flesh depreciates, their weight decreases, and it takes several weeks to get them back into good market condition.

The Pekin duck (fig. 1) originated in China and about 1873 was introduced into this country, where it soon became the most popular breed on commercial duck farms. With very few exceptions all the Pekins in this country are descended from about 20 ducks. The in-

roduction of the Pekin, which was soon followed by the use of artificial incubation, practically marks the beginning of intensive commercial duck farming in the United States. A duck of this breed has a creamy-white plumage, a long, broad, and deep body, with a full breast and deep keel (the part extending backward from the breast). The color of the skin is yellow, the shanks and toes should be reddish orange, and the bill orange yellow, free from black. Standard weights of the adult drake and duck are 9 and 8 pounds, respectively. The Pekin combines utility and beauty to a high degree, and the ducks kept on the commercial farms are very uniform. They are hardy, are fair layers, practically nonsitters, and are especially adapted for the production of flesh. They are timid and

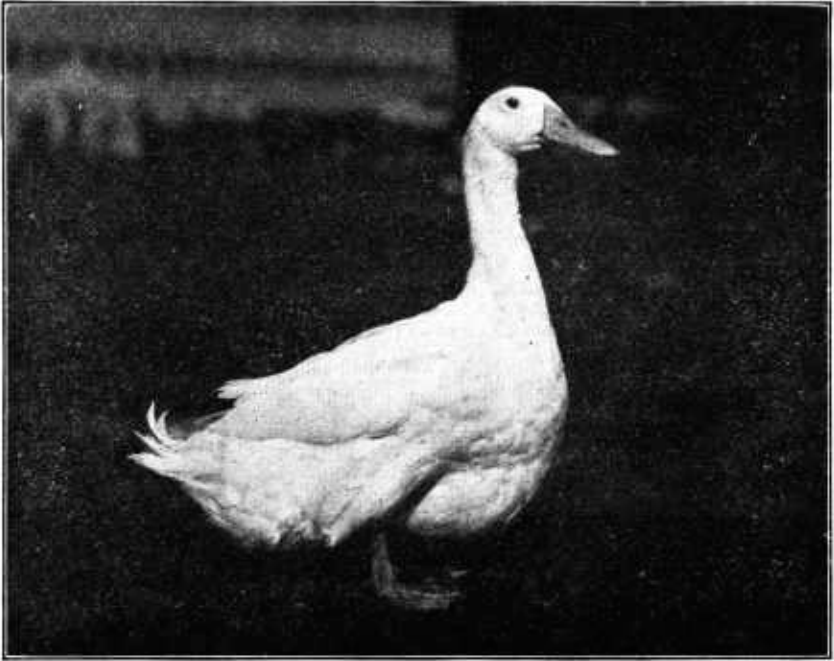


FIG. 2.—Aylesbury drake

easily frightened, very docile, easily confined by low fences, and well adapted for either commercial duck farming or as a side issue on general farms.

#### THE AYLESBURY

The Aylesbury duck (fig. 2) is a native of England, in which country it is much more popular than the Pekin. It is a large, white duck having the same standard weights and general type as the Pekin, but its body carriage is nearly horizontal. This breed resembles the Pekin in many ways, but has never become popular in this country, although it was used before the introduction of the Pekin. The Aylesbury ducks kept in this country seem to be less hardy and vigorous than the Pekins, but are adapted for use on

either commercial duck farms or general farms. The breed has pure white plumage, whereas in the Pekin it is creamy white.

#### THE MUSCOVY

There are two standard varieties of Muscovy ducks, the white and the dark. This breed originated in South America and is thought to be a different species from the other ducks in the United States, although it may be crossed with domestic varieties of ducks, producing hybrids which are sometimes fertile. The head and face of the Muscovy (fig. 3) are partly bare, with red, rough, carunculated skin. It has a long, broad body, with greater breadth but less depth and less keel development than the Pekin. The drake should be at least one-third larger than the duck, as the standard weight of the

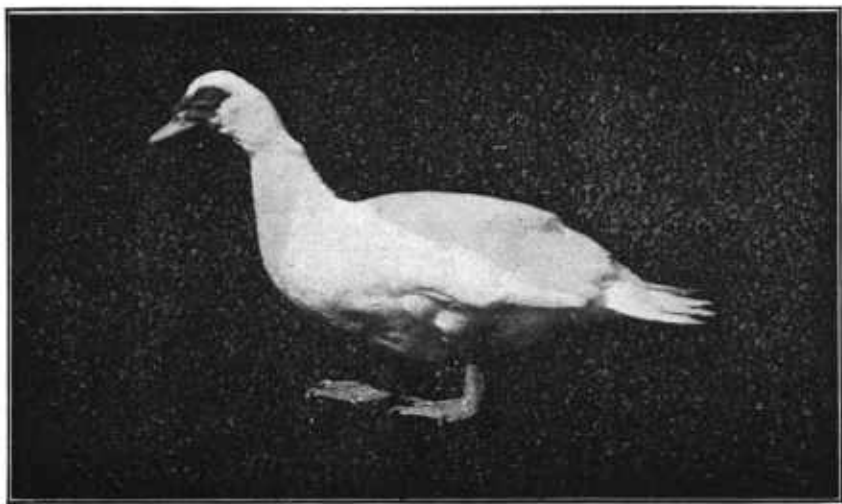


FIG. 3.—White Muscovy drake

adult drake is 10 pounds and that of the duck 7 pounds. The white variety has pure white plumage, pale orange or yellow legs, and a pinkish, flesh-colored beak. The breast, body, and back of the dark Muscovy are a lustrous blue black, broken with some white. The wing coverts are also a lustrous blue black with splashes of white, and the tail is black. The bill is pink, shaded with horn, and the legs may be yellow or a dark, leaden color.

Muscovy ducks are not well adapted for commercial duck farming, as they are only fair layers, and they are not well suited for marketing because of the difference in size of the duck and the drake. Moreover, they are good fliers and can readily fly over ordinary poultry fences. However, the breed is a wide forager, requires very little care, is not so noisy as the Pekin, and can be kept with fair success on general farms.

## THE ROUEN

The Rouen duck (fig. 4) derives its name from the city of Rouen, in northern France, and was probably derived from a similar type of common or native duck by selection. In shape and type this breed is similar to the Pekin, and it has the same size and standard weights. The eyes are dark brown, and the head and upper part of the neck of the male are green, with a white ring around the neck, while the back is gray mixed with green near the neck, shading into a lustrous green near the tail. The lower part of the body is gray, and the breast is claret colored. The tail and wings are gray and brown,



FIG. 4.—Rouen duck

mixed with some green, while the wings have a wide, purple bar with narrow, white bars on each side of the purple, which are exposed when the wing is folded. The shanks and toes are an orange or orange-brown color. The duck is barred on the wings similarly to the drake, but the color of the plumage of her body is brown, with penciling in all sections. This breed has very handsome markings but does not make so desirable a market duck as the Pekin or Aylesbury, as it does not mature so quickly, and besides has dark-colored pinfeathers. It is not adapted to conditions of commercial duck farming, but is suitable for use by the fancier or by the general farmer.

## THE CAYUGA

The Cayuga duck derives its name from Cayuga County, N. Y., where it probably was developed about 1850. It resembles the Pekin in shape, but the standard weight is 1 pound lighter. The Cayuga is a good market duck, but it is not widely distributed, and, because of its dark plumage, it is not so good a market duck as the Pekin. The Cayuga duck is a fair layer and may be raised with success on general farms. The plumage is a greenish black in all sections of the body, except that the drake may have brown flight feathers; the eyes are dark brown; and the shanks and toes are black or dark slate color.

## THE BUFF

The Buff duck, more commonly called the Buff Orpington, originated in England and was not admitted to the American Standard of Perfection until 1915. It is said to have been produced by crossing the Runner, Aylesbury, Rouen, and Cayuga. Standard weights are 1 pound lighter in each class than the Pekin. It has been developed in England for the production of eggs and is a good producer, and also makes a fair market or table duck. The breed has not been bred much in this country but has qualities which would make it a good duck to keep on general farms for both eggs and meat production if it were improved. The Buff has good length of body, which is broad, deep, and well rounded. The plumage is an even shade of rich, fawn buff, except the head and the upper portion of the neck in the drake, which should be seal brown.

## THE BLUE SWEDISH

The Blue Swedish duck probably originated in Germany, although blue ducks are found in several other European countries. The breed resembles the Pekin in type, but is smaller, with the same standard weights as the Cayuga, except that both the young drake and the young duck are one-half pound lighter than in that breed. The plumage of the Blue Swedish is blue in all sections, except that it has a white bib on the neck and the two main flight feathers are pure white. This breed is not widely distributed in this country and is not so well adapted for commercial purposes as a white duck; however, it is a fair variety for use on general farms.

## THE EGG-LAYING CLASS

## THE RUNNER

The Runner, commonly called the Indian Runner, received its name from its supposed introduction from East India, but the evidence appears to show that it is a selected type of a duck which was common in Belgium and Holland. There are three standard varieties of Runner ducks—the Fawn and White, the White, and the Penciled. The Fawn and White is fawn or gray and white, with a white neck and a line of white running up to the eyes and extending around the bill. The back and shoulders are fawn, and the

upper part of the breast and wings are fawn, but the lower part is white. The breast is full; the body is long and narrow, sloping gradually into the neck, and is carried erect, with no indication of a keel, the body resembling somewhat that of a penguin in shape. The shanks and toes are orange-red, and the bill of the young drake is yellow, later becoming greenish-yellow, while a young duck has a yellow bill spotted with green, which later becomes a dull green.

The plumage of the White variety (fig. 5) is pure white in all sections. The bill is yellow and the shanks and toes are orange. The color of the Penciled variety (fig. 6) resembles that of the Fawn and White except that the head of the male is a dull, bronze-green



FIG. 5.—White Runner drake

and white and the back has a soft, fawn ground, finely stippled with a slightly darker shade of fawn. The body and the upper section of the breast are medium fawn and the tail is a dull, bronze-green. The head of the female is a medium fawn and white, while the white markings in the plumage resemble those of the male. The colored markings are a medium fawn throughout, with a light line of fawn color running around the edge of each feather, the border being a darker shade.

The Runner duck is much smaller than breeds of the meat type, the adult drake having a standard weight of  $4\frac{1}{2}$  pounds and the duck 4 pounds. A few years ago the merits of this breed were advertised

extensively, and the number of Indian Runner ducks increased rapidly for a few years, but this greater rate of increase did not last. They are among the best layers of all the American standard breeds of ducks and hold the same relative position in the duck family that the Leghorn does among the breeds of domestic fowl. This breed lays a good-sized white egg considerably larger than a hen's egg. Runner ducks are active, are good foragers, nonsitters, and hardy. Their skin is yellow, and they make fair broilers, weighing from  $2\frac{1}{2}$  to 3 pounds each at about 6 weeks of age. They are not adapted for the production of large green ducks, but may be kept to produce ducklings of broiler size. The Runner ducks have made excellent records in the egg-laying contests, both in this country and abroad.



FIG. 6.—Penciled Runner drake

The Runner is a good breed for the general farmer and is one of the best for the production of market eggs. Opportunities to keep ducks for the production of eggs for market appear to be rather limited in this country.

Runner, Buff, and Khaki-Campbell ducks have proved to be good egg producers. The Khaki-Campbell is not included in the American Standard of Perfection. These ducks will produce well for three or four years; and the record the second year is often as high as the first year. If the production of duck eggs for market is considered, special attention should be given to procuring ducks which have been bred for egg production. The business of the production of duck eggs for market is discussed in the latter part of this bulletin, under "Marketing ducks' eggs."

## THE ORNAMENTAL CLASS

## THE CALL

There are two varieties of Call ducks, the Gray and the White. They are the bantams of the duck family, are kept for exhibition or for fancy purposes and are used as decoys in wild-duck shooting. This breed is said to be especially good for decoys when crossed with the wild Mallard or with the common duck. The Gray Call has the color markings of the Rouen and closely resembles the wild Mallard. The plumage of the White Call is pure white. Ducks of this breed have no standard weights, but are bred and selected for small size.

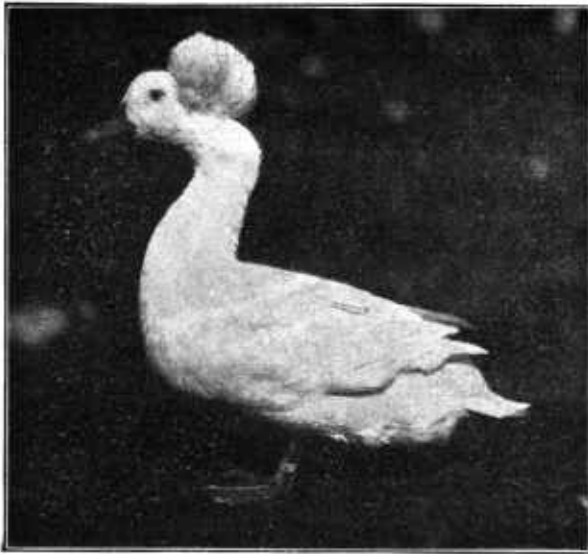


FIG. 7.—Crested White drake

## THE CRESTED WHITE

The Crested White is a white ornamental duck of medium size and has a crest. (Fig. 7.) The standard weights are a pound less than those of the Cayuga duck.

## THE BLACK EAST INDIA

The Black East India duck is of practically the same size and type as the Call duck and is kept entirely for ornamental purposes. The plumage is a deep black, with a brilliant, greenish tint. This duck is very shy and does not breed well in confinement. Crested White and the Black East India ducks are somewhat rare in this country.

## THE MANDARIN AND THE WOOD

The Mandarin and the Wood, or Carolina ducks, which are the most ornamental of the small breeds of waterfowl, are not included

in the American Standard of Perfection. The plumage of these breeds is handsomely marked and contains several brilliant colors. Both varieties are commonly kept in parks and zoological gardens with other ornamental waterfowl.

#### DUCK FARMING

Duck raising on a large scale has been developed as a special business to a considerable extent on Long Island (fig. 8) and in sections within easy shipping distance of New York City, Boston, and Philadelphia. A location with either good railroad or good truck shipping facilities to a near-by large city where ducks are in demand is essential for a large duck farm. Large flocks of ducks are very noisy, and require a somewhat isolated location. Intensive duck farming on a large scale has been more successful than intensive chicken raising, as Pekin ducks, especially, stand confinement well,

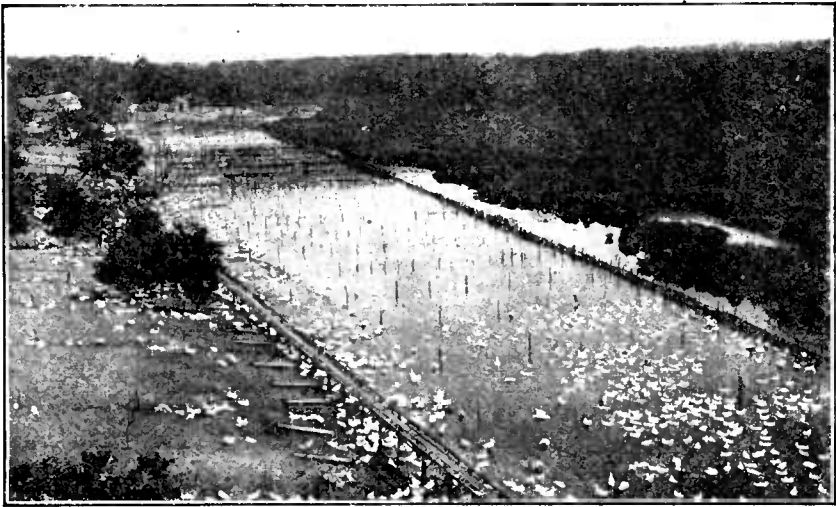


FIG. 8.—Large duck farm on Long Island

are more easily brooded, and are less subject to disease than chickens. Artificial methods of hatching and rearing and labor-saving machinery have been used very successfully on duck farms.

The demand for table ducks at good prices is mostly limited to a few large cities and is not nearly so general as the demand for chickens or fowls. The demand, however, appears to be gradually increasing, but the lack of a wide market materially influences the establishment and growth of duck farms. It would be possible to build up sufficient trade in most of the larger cities, especially in those containing a considerable percentage of foreign-born population, to take the product of one good-sized duck farm. The market conditions should be studied carefully before a large investment in ducks is made. The rearing of ducks for market on a large scale is a business requiring capital and extensive experience. Practical experience on a large duck plant is the best teacher, but the novice should begin in a small way and enlarge as experience justifies.

Ducks can be raised with success and at a profit on general farms, but are not so well adapted as fowls to supply a source of income under average farm conditions, although they serve to add variety of both meat and eggs for the farmer's table. Breeds of ducks which are of good, marketable, table quality and also are fair egg producers are best suited for use on general farms and may be kept profitably wherever good pasture land with running water is available. The Pekin, Rouen, and Cayuga are the best breeds for this purpose, while the egg breeds, such as the Runner, may be a profitable breed to keep on many farms. Their house should be near the water, and the site should be fenced sufficiently to keep livestock away. Farmers rarely give the necessary care to their ducklings in either feeding or marketing to be able to cater to the trade in fancy green ducks.



FIG. 9.—Duck yards extending into water

#### SITUATION AND ARRANGEMENT

The most desirable situation for a duck farm is on a light sandy soil with a gentle southern slope, leading to a stream, as shown in Figure 9, so that the pens for the breeders can be extended 25 feet or more into running water, as the fertility of the eggs is better, as a rule, if the ducks have access to water. A natural supply of water is almost essential for commercial duck farming and lessens the labor. The arrangement of the buildings should be planned to economize labor and allow for increase of the equipment. The necessary buildings consist of breeding pens, an incubator cellar, brooder houses, fattening sheds, and places for storing and mixing feed and for killing and picking the ducks. The pens in the houses, the outside yards, and the arrangement of the buildings should be planned

so that the ducks may be easily driven from house to house. The feed room or house should be centrally located.

Considerable machinery for mixing feed is used on all large duck farms, and most of these farms have tracks for feed trucks, pushed by hand, to facilitate the moving of feed to the different houses and yards. Convenient watering arrangements are essential where large numbers of ducks are kept, as ducks require a large quantity of drinking water. \* Plenty of shade should be provided for all the ducks. Although they may be kept successfully under very intensive conditions, it is advisable to allow considerable yard space. Double yards, which may be rotated and planted to quick-growing crops, such as oats, wheat, and rye, are good for intensive duck farms.

Most of the Long Island duck farms have sandy yards which are cleansed by the rise and fall of the tide. All duck yards should be made on gently sloping land. The yards must be kept clean, which



FIG. 10.—Flock of breeding ducks and breeding house

may require scraping off the top surface in some yards. Sufficient land should be available to raise green feed and to utilize the manure produced. Ducks for market should be allowed to go into the water after they are 6 weeks old, as it saves much labor in watering and greatly improves their feathers for market. Ducklings under 6 weeks should not be allowed to go into water.

#### HOUSES

The site of the poultry house must be dry, well drained, and raised above the general level of the land. A light, porous soil makes the best location. A shed-roof breeding house 24 feet deep and 48 feet long, 8½ feet high in front and 5 feet in the rear, makes a good house and will hold two flocks consisting of 50 breeders in each, as it is best to allow approximately 10 square feet of floor space for each breeding duck. (Fig. 10.) Breeders are usually kept in flocks of from 30 to 60, but in some cases as many as 100 duck breeders are

kept in one flock. About half of the front of the building should be of glass windows and space for muslin curtains, in equal proportions. A glass window on the east and one on the west end help to ventilate and dry out the house during mild days. The walls, except on the north side, may be of barn boards 12 inches wide, with the cracks left open for ventilation. Ventilation is of vital importance, as the comfort and health of the ducks depend upon an abundant supply of pure, dry air. The roof should be water-tight. A dirt floor which is from 4 to 6 inches above the ground level is satisfactory on light, well-drained soil. Board floors, raised 6 or 8 inches above the ground and covered with 4 inches of sand or dry earth may be used.

The breeding pens should be bedded down with additional straw or shavings whenever the litter gets wet and soiled. The litter is allowed to accumulate and is cleaned out only twice a year. It helps to keep the ducks comfortable during the winter but makes good ventilation absolutely necessary. During the day, except in stormy and cold weather, all the windows should be opened wide to allow the bedding to dry. Nests are usually provided, made like stalls, 12 inches wide, 18 inches deep, boards about 12 inches high being used to separate the nests. These 12-inch partition boards are nailed to a strip about 5 inches high, which forms the front of the nest, making a row of nests when placed against the back or side of a building. Some duck breeders do not provide nests but allow the ducks to lay on the floor. The yards should be about 100 feet long and the width of the pen, and extend 30 feet into the stream if possible. Poultry wire about 2 feet high will keep mature ducks in their respective yards, and 18-inch high wire will hold ducklings.

#### BROODER HOUSES

Long brooder houses heated by hot-water-pipe systems are used where ducks are raised on a large scale, as shown in Figure 11. A single brooder house should face the south, and double brooder houses should face east and west. There should be a large glass window for each pen in the brooder, as plenty of light is desirable. The window should be arranged so that it can be easily opened to allow direct sunlight in each pen. A shed-roof house, about 12 feet deep, 6½ feet high in front, 4½ feet in the rear, and as long as desired, makes a good building for a single brooder house. (Fig. 11.)

A double brooder house should have a gable roof with sides about 5 feet high and ridge 8 feet high. The hot-water pipes run through the center of the building, four on each side of the dividing pen partition which runs through the center of the house. Over these pipes is a platform under which the ducks hover, and it is also used by the attendant as a walk. (Fig. 12.) No cloth cover is used in front of the pipes except in severe weather, when a burlap bag may be hung there. This double house is 20 feet wide, and each pen is divided into sections 4 feet wide and 10 feet long, including run under the pipe. Each section will take care of 100 baby ducklings. Each partition should be about 1 foot high and so arranged that part of the partition in each pen can be removed in order to drive the ducks from one pen to the other, as the heating pipes are nearer the floor in one end of the

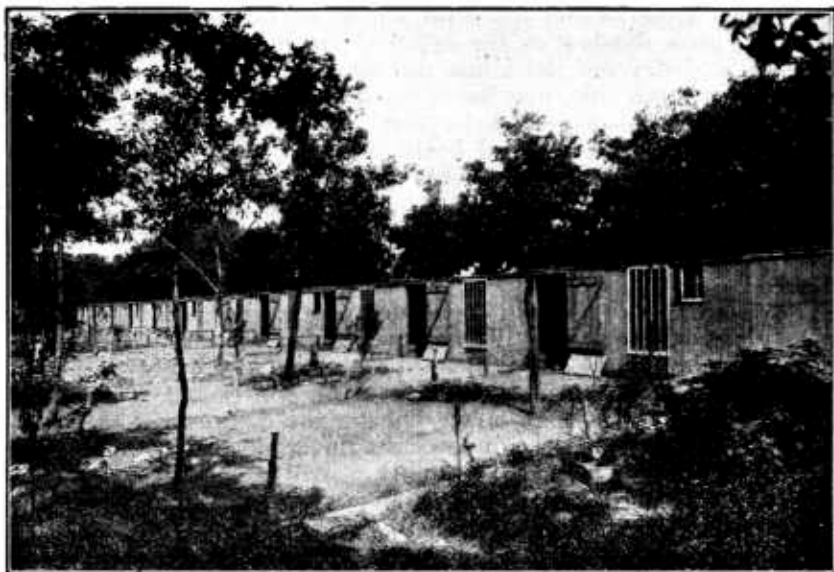


FIG. 11.—Brooder house for raising young ducks on a large scale

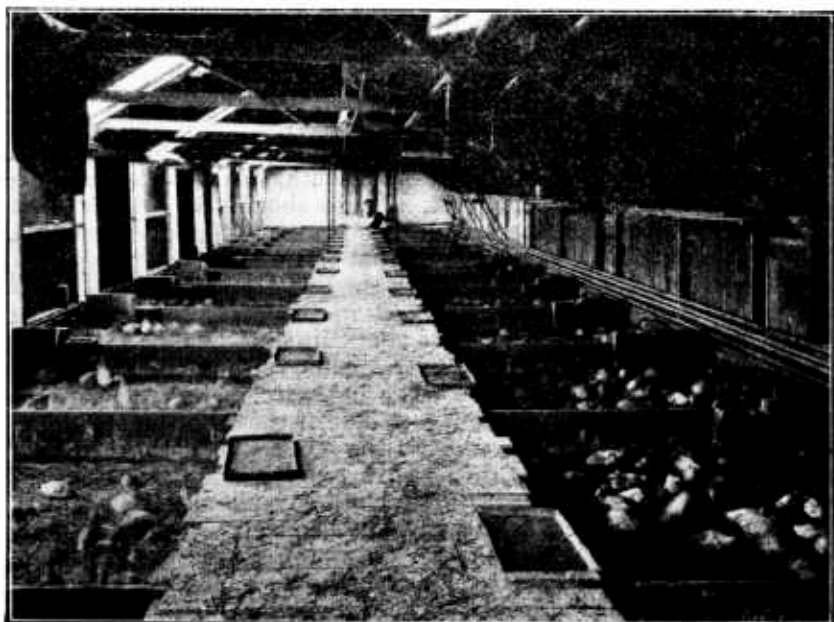


FIG. 12.—Interior of duck brooder house, showing feeding pans in center. Hot-water pipes and hover are in the center of the house, under board walk

house and gradually rise toward the farther end of the building, to take care of the ducklings of different ages. The smallest ducklings are kept where the pipes are nearest to the floor, or about 3 inches above their heads, and as they grow they are moved to pens where the pipes are higher; less heat is needed as they develop.

A second gable-roof brooder house about 20 feet deep is used with pipes placed much higher from the floor of the pen in order to accustom the ducks to less heat before they are transferred to a cold brooder house. These pens in the second brooder are about 10 by 15 feet, accommodating about 200 ducklings when 3 or 4 weeks old. A third or cold brooder house is not heated, and may be a shed-roof house about 18 feet deep, 4½ feet high in the rear, and 7 feet in front. Large, cold brooder houses, up to 30 feet in width, are sometimes used in place of the narrow houses.



FIG. 13.—Breeding flock of Pekin ducks

Good judgment must be used when transferring ducklings from a second heated brooder house to a cold one, as early hatched ducklings require heat much longer than late-hatched ducklings. They are transferred from the cold brooder to the fattening pens along the water front when the feathers are partly grown on their backs, as after that age they do not require shelter, except shade from the hot sun.

#### SELECTING AND MATING

The selection of vigorous breeding ducks is very essential to successful duck farming. The breeders are selected about July 1 from the young ducks that are almost ready for market at that time. Only the most vigorous and best-developed ducks are saved for breeding. (Fig. 13.) These ducks are kept only during their first

laying season and are then marketed. Older ducks do not lay eggs enough during the early part of the winter to produce sufficient numbers of market ducks, but it may pay to keep a few, out of which to get the breeding stock.

In handling ducks pick them up by their necks rather than by the legs, as the latter are apt to break easily. Ducks lay their eggs early in the morning and should be confined to the house or pen until 9.30 a. m. If allowed to roam early in the morning they may lay in a pond or stream and the eggs may be lost. The average Pekin duck lays from 100 to 120 eggs each season. These ducks are kept only for the production of good hatching eggs and are fed so that they will begin to lay in November or December. The drake is usually coarser and more masculine in appearance than the duck and has a distinct curl in his tail feathers. During the cold weather 5 ducks may be mated to 1 drake, about April 1, 6 to 1 is sufficient, and later, about June 1, 7 or 8 ducks to 1 drake. On large duck farms ducks are sometimes mated in pens of 100 or more. Three hundred breeders will produce market ducks enough for a one-man duck farm.

#### INCUBATION

The period of incubation for ducks' eggs is 28 days, except for the Muscovy duck, which is 33 to 35 days. The eggs may be hatched either naturally or artificially, but on practically all the large duck farms the hatching is done in incubators. Incubators should be operated in a well-ventilated room or cellar, which is about two-thirds below the ground level, so that the temperature remains fairly even. The cellar should be from  $7\frac{1}{2}$  to  $8\frac{1}{2}$  feet high, with plenty of windows above the ground level for light and ventilation. Large incubators with automatic devices for turning the eggs are used on almost all the duck farms. Strong, fertile eggs are a prime essential to good hatching and are obtained only from stock properly mated and kept under the best possible conditions for health and vigor.

Pekin and Runner ducks rarely sit; consequently, if natural methods of incubation are to be used, the eggs are usually hatched under hens. Ducks' eggs should be washed as collected if dirty, as washing does not appear to injure their hatching qualities. Hens must be well cared for in hatching ducks' eggs, as the period of incubation is a week longer than that of hens' eggs. It takes ducklings usually from 24 to 48 hours to hatch after they pick the shells; therefore it is advisable to allow the hen to get off the nest for feed and water when the first ducklings pick the shell and then confine her to the nest until after the hatching is over. Ducks' eggs need more moisture than hens' eggs at hatching time, as it takes the ducks much longer to get out of the shells. The eggs, therefore, should be sprinkled with warm water just before they are ready to pip.

The incubators should be perfectly level and should be operated for a few days before the eggs are put in. The thermometer should be arranged so that the bulb just clears the top of the eggs; with the bulb in this position the temperature should be  $102\frac{1}{2}^{\circ}$  F. for the first week,  $103^{\circ}$  from then until time of hatching, when it may be allowed to reach  $103\frac{1}{2}^{\circ}$ .

Incubators planned for hatching duck eggs may be obtained from the incubator manufacturers, but when only a few eggs are to be hatched the regular hen-egg machine may be used. Follow the manufacturers' directions in operating the incubator. The eggs are usually turned twice a day from the third to the twenty-fifth day, inclusive, but if the incubator has an automatic turning device, it pays to turn the eggs at least three times daily. The eggs may be cooled from the tenth to the twenty-fourth day, inclusive, but the practice of cooling eggs is not so general as it has been. Cooling should be regulated according to the room temperature.

It is usually advisable to supply moisture for duck eggs after the tenth day of incubation, but this depends on the make of the incubator, on the climate, and especially on the humidity of the place where the incubator is operated. Many methods are used to supply moisture in incubation, such as sprinkling the eggs with warm water heated to about 100° F., or placing below the egg tray a pan of water, a receptacle containing moist sand, or a wet sponge. Other common methods of supplying moisture are to sprinkle or soak the floor of the incubator room or to place a pail of warm water under the lamp.

Eggs which have become overheated can be cooled quickly by sprinkling with cold water. Shut the incubator tightly when the ducklings begin to pip, close the ventilators, and do not open the machine until the hatching is over. If the tray is too crowded with ducklings, ventilators may be opened when the hatch is two-thirds off, but the doors should not be opened under any circumstances. When all the ducklings are hatched, remove the egg tray; open the ventilators, and keep the incubator door open slightly. Allow the ducklings to remain in the incubator from 24 to 36 hours at a temperature of 90° F. without feeding. In taking the ducklings to the brooder house, keep them well covered to guard against chilling.

#### TESTING EGGS

All eggs are tested two or three times during incubation, and the infertile eggs and those with dead germs are removed. Dead germs in duck eggs decompose very rapidly and are often detected by their odor. Such eggs should be removed from the incubator. Infertile eggs, when boiled hard, make good feed for ducklings. Infertile eggs are often used for culinary purposes or sold to bakers. The first test is usually made on the fifth or sixth day and the eggs are tested with the large end up, so that the size of the air cell may be seen, as well as the condition of the embryo.

Testing should be done in a dark room. The infertile egg when held before the tester looks perfectly clear, much the same as a fresh egg, whereas a fertile egg shows a small, dark spot—the embryo—with a network of small blood veins extending in all directions if the embryo is living, but if it is dead the blood settles away from the embryo toward the edge of the yolk, forming in most cases an irregular circle of blood, known as a blood ring. The eggs containing strong, living embryos are dark and partly filled by the twenty-first day, and show a clear, distinct line of demarcation between the air cell and the growing embryo, whereas dead germs show only partial development and lack this clear, distinct outline.

## BROODING

Ducks are much easier to brood artificially than chickens, and artificial methods are used entirely on duck farms. The ducklings are removed from the incubator from 24 to 36 hours after hatching, taken to the brooder house (fig. 12), and then given their first feed. About 100 ducklings are placed in a pen 4 by 10 feet. A board across the pen allows the ducklings to wander only 3 feet from brooder pipes during the first three days. If ducklings are raised under hens, it is advisable to confine the hens and allow the ducklings free range, as the hens are apt to wander too far with their broods.

The temperature under the hover should be 95° F. for the first week, 85° the second week, and about 80° for the third week and until they are removed to the second brooder house, where the temperature under the hover is kept at from 70 to 75°. From the second brooder house they are driven to the cold brooder house without heat when 6 weeks old—a little earlier in the warmer months and a little later in the colder months. The temperature at which to keep the hover depends on the section of the country and the weather conditions. Lights are commonly used all night in the pens of ducklings, to keep them more contented. This also increases feed consumption. Shade in the yards is essential for ducklings during warm weather. This is usually provided by the use of artificial shelters. About four weeks before marketing, the ducks are transferred to the fattening yards, which preferably extend into the water about 50 feet. Lights are also used in the fattening pens. About 300 ducks are placed in each yard, which is about 100 by 150 feet. Here they have a chance to swim and clean their plumage in the water until ready for market.

## METHODS OF FEEDING

The ducks to be used for breeders are separated about July 1 from the growing ducks and fed a bulky mash containing very little meat. The object in feeding these ducks is to develop breeders which will produce the best hatching eggs. All duck rations are fed as a moist mash and are usually mixed in dough mixers or good-sized mixing machines. A good breeding mash may be made of 10 parts, by weight, bran, 5 parts middlings, 5 parts yellow corn meal, and one-third part meat scrap or fish meal. This mash is mixed with green feed, from one-third to one-half as much green feed as mash by bulk being used. The meat scrap or fish meals is gradually increased, beginning about October 1, to about 12 per cent of the grain by October 15, which is the maximum quantity desirable in a laying ration for breeders. At this time the corn meal is also increased, making the mash consist of 10 parts, by weight, bran, 5 parts middlings, 15 parts yellow corn meal, and 4 parts meat scrap or fish meal. All duck rations are mixed with green feed. Another good ration for egg production for breeding ducks consists of the following, the proportions being by weight: 1 part bran, one-half part middlings, one-half part low-grade flour, 2 parts yellow corn meal, one-half part meat scrap, and one-fourth part cooked fish or one-eighth part fish meal, mixed with green feed. The breeding ducks

should be fed twice daily—in the morning and at night. A light feed of equal parts whole corn and oats is sometimes used with these mashers for laying ducks. Green feed consists of creek grass, clover, young corn, rye, cowpeas, or any other available green feed, cut up by machine in about  $\frac{1}{2}$ -inch lengths and mixed in the feed. Ground alfalfa may be used if no green feed is available, about 15 per cent being used in the mash. Cooked vegetables at the rate of one-fifth of the mash may also be used if no green feed is available. Rye is the first green feed in the spring, followed by oats, and then fodder corn in the summer. In August rape is sown and is available until freezing weather.

Breeding ducks are given all they will eat. The feed should be wet enough to hold together when squeezed, somewhere between sticky and crumbly, but it must not be crumbly. It is not advisable to feed fresh fish entirely and no meat scrap, as fresh fish is not always available, and changing the ration is likely to cut down the egg yield. Oyster shell and sand should always be kept before the breeding or laying ducks. Breeding ducks which are laying should be shut in the house in the evening and not released until about 9.30 a. m., so that they will lay their eggs in the house. The meat scrap in these laying rations may be increased to about 15 per cent, and the quantity of green feed reduced for the production of market eggs in feeding the Runner or egg breeds. Such breeds are fed laying rations throughout the year. Other good rations for laying ducks fed for market eggs may be made of a mash of 3 parts middlings, 1 part corn meal, 1 part ground oats, 2 parts bran, and 1 part fish or meat meal. This is fed with a grain mixture of 3 parts wheat and 1 part corn. A good ration may be made of mash alone by using 4 parts middlings, 2 parts corn meal, 2 parts ground oats, 1 part bran, and  $1\frac{1}{2}$  parts meat or fish meal.

Ducklings should not be fed until about 48 hours after they are hatched. For the first five days in the brooder house, feed a moist mash of 2 parts, by weight, bran, 1 part yellow corn meal, and one-half part low-grade flour or middlings, to every 100 pounds of which add 10 pounds of ground oat groats or rolled oats, 3 pounds of sifted meat scrap or fish meal, and 3 pounds of sifted sand. It is advisable to mix this mash with milk. Eggs are an excellent feed to use in place of the meat scrap for this first feed, using two infertile incubator eggs, hard boiled, to every quart of feed. The ducklings are usually fed five times daily until 5 days old, four times daily from the fifth day until they are 4 weeks old, and three times daily until marketed. Sand or grit is kept before them all the time. When the ducklings are 5 days old the eggs and milk are omitted from the ration, and 5 pounds of meat scrap is included in 100 pounds of mash. At 2 weeks of age the meat scrap is increased to 10 pounds per 100 and at 4 weeks to 15 pounds per 100. Increase the corn meal to 2 parts at the fifth or sixth week and add about 10 per cent by bulk of green feed to the ration.

Ducklings should be allowed to range only about  $2\frac{1}{2}$  feet from the hover for the first three or four days, until they learn to run under the hover for heat. The pens should be bedded with straw or shavings. Water should be given them at each feeding time in protected fountains, arranged so as not to wet the straw or bedding.

Brooder-house pens should be cleaned out about every 10 days and fresh straw added. During the winter months, after the ducks are 10 days to 2 weeks old, they are usually allowed out of the brooder house whenever the weather is good. If it is necessary to confine the ducklings to the house all or most of the time, 2 per cent of cod-liver oil should be added to the mash. If little direct sunlight is available during the winter months, it probably would be advisable to use the cod-liver oil. It should be omitted from the ration for at least two weeks before the ducks are marketed, as it may affect the flavor of the flesh.

When the ducks are well feathered, at from 7 to 8 weeks of age (fig. 14), they are moved to the water front and fed a fattening mash, until marketed, of 3 parts (by weight) corn meal, 1 part bran, 1 part meat scrap, 1 part low-grade flour or middlings, and one-half

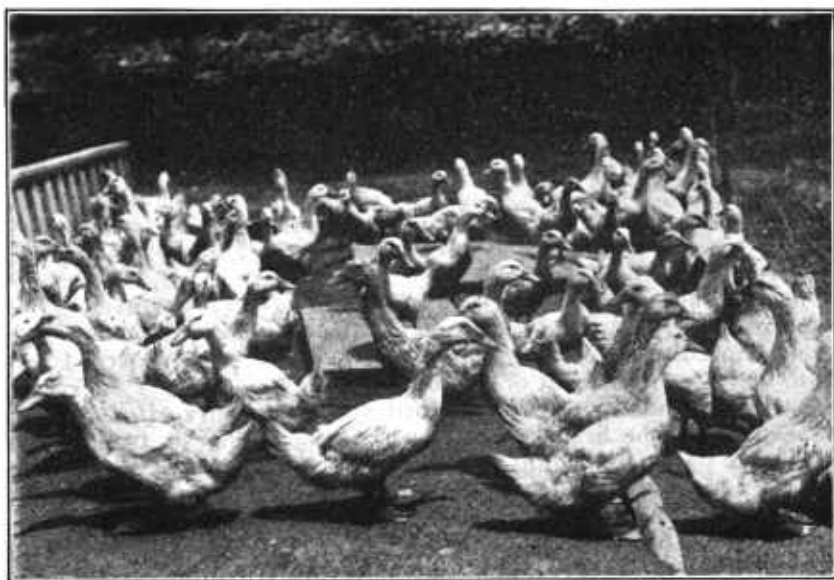


FIG. 14.—Pekin ducks about 7 weeks old in fattening pen

part green feed. Feed troughs should be kept near the water in the fattening pens to reduce exercise. Fresh fish, if used, should be left out of the ration for market ducks four weeks before they are to be killed, so that no fishy flavor may be given to the flesh. Feed should not be left before the ducks and allowed to sour, as it is apt to cause convulsions and death, especially among young ducklings. Ducklings and ducks are usually fed mash on flat feed boards rather than in troughs. Plenty of drinking water is very essential and should be near the feed, so that the ducks can eat and drink at about the same time. Water fountains should be deep enough to allow the ducks to get their bills into the water to wash sand or grit out of their nostrils. Green ducks are usually marketed when 10 weeks old, but the marketing age varies from 8 to 12 weeks of age, according to their condition, weight, and the season of the year. In the

New York market preference is given to ducks weighing about  $5\frac{1}{2}$  pounds each. Buttermilk, either concentrated or dried, is being used in the feeding and fattening of ducks.

The loss in rearing ducklings under good conditions is usually from about 8 to 10 per cent, and both ducklings and breeding ducks are comparatively free from diseases if properly managed. The losses in growing ducks usually occur before the ducklings are 1 month old. Ducks are affected by the same diseases as chickens, and similar methods of treatment are used.

#### PREPARING DUCKS FOR MARKET

Most ducks are sent to the city markets dressed, but some markets, especially New York City, handle a large number of live ducks. Green ducks should not be held after the long wing feathers have reached their full length, as the ducks reach their best condition at that time. The ducks are usually hung up by their feet in a row,



FIG. 15.—Open-shed shelter for fattening ducks

and the jugular vein in the throat just below the base of the skull is cut through the mouth. As soon as the cut has been made the duck is stunned either by a hard blow on the head or by plunging the point of a knife into the brain through the roof of the mouth. A blood can or a weight is hooked through the mouth, and the feathers are plucked. If the ducks are to be scalded they are allowed to hang until thoroughly bled. The blood is saved and mixed in the mash for the growing ducks. The ducks are usually scalded for the New York market but dry-picked ducks are preferred in some cities. The water for scalding should be just below boiling, as too hot water discolors the flesh; the ducks should be scalded just as soon as they are through bleeding. The long tail feathers are left on the ducks, the wings are picked to the first joint and the neck halfway to the head. Long pinfeathers usually are removed with a dull knife, and the down is rubbed off with the moistened hand or shaved with a very sharp knife. Large duck farms usually have pickers who devote their time entirely to the dressing of ducks during the

marketing season and are very proficient in the work. The average duck picker can pick from 50 to 70 ducks in a day.

After the ducks are picked they are usually washed and put into ice or cold water to cool and "plump." They are packed in barrels and sent to market either with or without ice, depending on the weather and the distance from market. For ice packing each layer of ducks, usually with the keels or breasts down, is packed flat in ice in barrels. A layer of crushed ice is placed on the bottom of the barrel on which is put a layer of dressed ducks, and alternate layers of ducks and ice are added until the barrel is nearly full; then the barrel is filled with a layer or header of ice. Boxes holding dry-packed ducks are also used in some sections. These dressed ducks should be graded according to their size and thoroughly chilled before they are packed in barrels or boxes. It costs about 7 cents apiece to pick ducks, but the feathers pay for the picking. Each duck yields about 2 ounces of marketable feathers. The feathers must be dried by spreading them out in thin layers in a loft, and they should be turned several times until they are thoroughly dried. Then they are sold to feather dealers and are shipped in large, burlap sacks.

Green ducks are marketed throughout the year. In 1927 dressed ducks brought from 34 cents a pound in January to 24 cents in July on the New York market when sold at wholesale. The highest prices are paid for the ducks marketed in March and April, and they decrease as the season advances and the supply becomes more abundant. When prices in the spring and summer are low many of the ducks are put into cold storage and held for higher prices. During part of the year the New York market prices for live ducks equaled or exceeded those paid for dressed ducks. Managers of large duck farms figure on marketing 50 ducks for each breeder. The demand for green ducks has been built up in large cities in the East and on the Pacific coast, and there is very little demand for them in small cities and towns. In recent years several inns specializing in duck dinners have been successfully operated in New York State and in Massachusetts. Ducks produced on general farms are not marketed until fall and bring lower prices than green ones.

#### MARKETING DUCKS' EGGS

The demand for ducks' eggs at a good price is limited and not nearly so general as the demand for hens' eggs. There is a good demand for ducks' eggs in the spring in New York and other cities at prices usually several cents a dozen higher than hens' eggs, but during the rest of the year ducks' eggs do not bring any higher prices than hens' eggs, although they are about one-fourth larger. The best grades of ducks' eggs sold in New York City for 58 cents a dozen the last of March, 1927. In April the sale price was about 48 cents, 36 cents in May, and 37 cents in June. A trade is gradually being established in some markets for fancy near-by ducks' eggs but the demand is very limited. Pure white eggs are preferred and usually bring the highest price. These eggs should be marketed frequently, as they depreciate in quality more rapidly than hens' eggs, especially during hot weather. The market for eggs should be carefully investigated by those who intend to raise breeds of the egg-laying type of ducks.